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TO : The Files-Contract 605

DATE: 14 May 1959FROM :

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SUBJECT: Trip Report -

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1. On 4 and 5 May 1959, the writer visited the to monitor progress on Contract 605 and to accept a 1 to 10 kmc DF antenna.

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2. Contract 605, T.O. 1 - The inflatable pouchable antennas covered by this task are nearing completion and one of the antennas will be delivered to us in a very short time. The other antennas will be delivered within 60 days of our acceptance of the first model. This allows sufficient time for any redesign or modifications which we desire. The time element can be greatly reduced if we feel that the antenna is acceptable without modifications. Some questions arose during the discussions about this antenna regarding the sterility of the antenna structure.

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3. Contract 605, T.O. 2 - This task, covering the design and development of an antenna covering the range of 30 to 600 mc is almost completed. At our request, is measuring the performance of the antenna in the range of 30 to 60 mc even though it is realized that the antenna performs badly in this range. has requested that the requirement for gain measurements be waived due to their lack of adequate gain measuring equipment in this range. In the event that this requirement can be waived, delivery of the modified and fully tested AN-20/CS-8 antenna is expected before the end of May 1959.

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4. Contract 605, T.O. 3 - This task has been completed and all corrections to the final report are in. Phase two of this development of an antenna system covering 50 to 40,000 mc is in the negotiation stage and has requested that we work very closely with them on this project, spelling out the requirements as much as possible so that they can supply a system which will adequately fulfill our needs.

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5. Contract 605, T.O. 4 - The construction of the parabolic reflectors and log periodic feed is essentially completed and one complete antenna is being readied for shipment. Pending our acceptance of this antenna, the remaining units will be shipped to us.

6. 1 to 10 KMC DF Antenna - This antenna was picked up by the writer at the [] and brought to Headquarters for shipment overseas. The antenna is satisfactory in almost all respects. Gain of the structure averages about 10 db over a dipole over the entire range and the VSWR as seen at the feedline terminals is 5 to 1 or less. [] had considerable difficulty in constructing the antenna to our requirements due to the radiation from the balun used in the feed structure. Although this problem has not been completely cured, the effect of balun radiation is such now as to be considered negligible. The feedline consists of a new type of semiflexible coax cable which is very stiff. Because of this, the cable cannot be rolled and unrolled more than 20 times and the minimum bend radius is about 6 inches. Failure to observe the above precautions will make the feedline useless at the higher frequencies.

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The cost of this program would be between \$5,000 and \$10,000. The third investigation would study the design of a vertically oriented and polarized half log periodic structure for HF use which would use ground reflections as the second half of the structure. Cost of this investigation would be between \$10,000 and \$15,000. The fourth investigation would study the design of slotted log periodic structures covering from 50 to 40,000 mc. This type of antenna would be useful where mechanical strength is desired in the antenna structure itself rather than being provided by plastic supporting blocks as in the present configurations. The cost would be between \$8,000 and \$10,000 .

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There is a distinct possibility that [] would be willing to share the cost of such a program on a 50-50 basis, because both parties would benefit from the results of such investigations. Dr. [] suggests that if we are interested in such a development program, it should be funded before the end of the current fiscal year.

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8. [] is studying the possibility of using parametric amplifiers in an antenna transmission system to work at frequencies less than 10 kmc. Basically the system would consist of a parametric amplifier mounted inside the log periodic structure which would convert upwards the signals received by the antenna. The gain resulting from this up-conversion is proportional to $(f_o/f_i)/(1 + (1 + x^2)^{1/2})$ where f_o is the parametric amplifier output frequency, f_i is the signal to be amplified, and x is a parameter of the parametric crystal. The output signal, f_o , would then be converted to a low frequency by conventional means and transmitted at a frequency of less than 100 mc over low-loss transmission lines to the receiver. Overall gain of the system would be improved, and with proper design techniques, it is claimed that the noise figure would not be increased to any great extent. Another approach to the problem is to reradiate the up converted signal at 10 kmc to a small dish antenna placed very near the receiver, thus simplifying the circuitry needed in the antenna.

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9. The possibility of building a voltage tunable band-pass filter using parametric techniques was discussed. Such a filter would consist of a section of waveguide, coax, or a tuned cavity, which would have a parametric device across it. Since the cut-off characteristics of a filter of this type can be varied by a change in shunt capacity, changing the voltage across the parametric device, thus changing the effective capacity of the device, would modify the characteristics of the filter. One possibility here is the construction of a scanning filter which is voltage-tuned with a sawtooth waveform such that a band of frequencies could be swept at a very high rate.

10. Some information was obtained concerning the new VSWR indicator which [] is using in their field microwave communications systems. The meter was made by [] and each movement is 30 μ A. full scale. Price runs about \$300.00 for a single unit. []

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[] subcontracted the meter development to [] for the [] project.

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OC-E/R+D-EP:JHB:pjb (13 May 1959)

cc: R+D Subject File

Monthly (2)

R+D Lab

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